SLOVENSKI STANDARD
SIST EN 4708-108:2019

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Aeronavtika - Toplotno skrčljiva cev za utrjevanje, izolacijo in identifikacijo - 108. del: Z izboljšanimi protipožarnimi lastnostmi - Delovna temperatura od –65 °C do 150 °C - Standard za proizvod

Aerospace series - Sleeving, heat-shrinkable, for binding, insulation and identification - Part 108: Limited fire hazard sleeving - Operating temperatures - 65 °C to 150 °C - Product standard

Luft- und Raumfahrt - Wärmeschrumpfender Schlauch zur Befestigung, Isolierung und Identifizierung - Teil 108: Begrenzte Brandgefahr - Temperaturbereich - 65 °C und 150 °C - Produktnorm

Série aérospatiale - Manchons thermorétractables, de jonction, isolement et identification - Partie 108 : Risque d'incendie limité - Températures d'utilisation - 65 °C à 150 °C - Norme de produit

Ta slovenski standard je istoveten z: **EN 4708-108:2019**

ICS:

49.025.40	Guma in polimerni materiali	Rubber and plastics
49.060	Letalska in vesoljska električna oprema in sistemi	Aerospace electric equipment and systems

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EUROPEAN STANDARD

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English Version

Aerospace series - Sleeving, heat-shrinkable, for binding, insulation and identification - Part 108: Limited fire hazard sleeving - Operating temperatures - 65 °C to 150 °C - Product standard

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This European Standard was approved by CEN on 14 July 2019.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN 4708-108:2019) has been prepared by the Aerospace and Defence Industries Association of Europe — Standardization (ASD-STAN).

After enquiries and votes carried out in accordance with the rules of this Association, this Standard has received the approval of the National Associations and the Official Services of the member countries of ASD, prior to its presentation to CEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 2020, and conflicting national standards shall be withdrawn at the latest by March 2020.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This document specifies the required characteristics for four types of heat-shrinkable limited fire hazard sleevings for use in aircraft electrical systems at operating temperatures between – 65 °C and 150 °C.

This sleeving is flexible, flame retarded and emits minimum smoke, gases and corrosive by-products when exposed to fire. It is available with various wall thicknesses and also in a higher shrink ratio according to the application and degree of mechanical protection required. It is suitable for use (e.g. as cable protection) in areas where smoke, gases or corrosive by-products would constitute a particular hazard.

Type A: Medium wall, shrink ratio 2:1 and is normally supplied with internal diameters up to 30 mm.

The standard colour is black.

Sizes or colours other than those specifically listed in this document may be available. These items shall be considered to comply with this document if they comply with the property requirements listed in Table 2 except for dimensions and mass.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 3909, *Aerospace series — Test fluids and test methods for electrical and optical components and sub-assemblies*

EN 4708-001, *Aerospace series — Sleeving, heat-shrinkable, for binding, insulation and identification — Part 001: Technical specification*[1)]

EN 60684-1, *Flexible insulating sleeving — Part 1: Definitions and general requirements* (IEC 60684-1)

EN 60684-2, *Flexible insulating sleeving — Part 2: Methods of test* (IEC 60684-2)

IEC 60757, *Code for designation of colours* [2)]

EN ISO 846, *Plastics — Evaluation of the action of micro-organisms* (ISO 846)

ISO 1817, *Rubber, vulcanized or thermoplastic — Determination of the effect of liquids*

MIL-PRF-87937, *Performance specification: Cleaning compound, aerospace equipment* [3)]

AMS 1428, *Fluid, Aircraft Deicing/Anti-Icing, Non Newtonian (Pseudoplastic), SAE Types II, III, and IV*[4)]

AMS 1476, *Deodorant, aircraft toilet*[4)]

ASTM D740, *Standard Specification for Methyl Ethyl Ketone*

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1) Published as ASD-STAN Prestandard at the date of publication of this standard by AeroSpace and Defence industries Association of Europe — Standardization (ASD-STAN), http://www.asd-stan.org/

2) Published by: IEC International Electrotechnical Commission. http://www.iec.ch/

3) Published by: Department of Defense (DoD). http://www.defenselink.mil/

4) Published by: SAE National (US) Society of Automotive Engineers. http://www.sae.org/

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 60684-1 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at http://www.iso.org/obp
- IEC Electropedia: available at http://www.electropedia.org/

4 Required characteristics

4.1 Dimensions and mass

See Table 1.

Table 1 — Dimensional and mass requirements for Type A

Size code	Internal diameter mm [inch][a]		Recovered wall thickness	Mass per unit length
	Expanded min.	Recovered max.	mm [inch][a]	max. g/m
3	3,0 [0,118]	1,5 [0,059]	0,70 ±0,10 [0,028 ± 0,004]	4,6
5	5,0 [0,197]	2,5 [0,098]	0,75 ± 0,15 [0,030 ± 0,006]	9,8
8	8,0 [0,315]	4,0 [0,157]	0,80 ± 0,15 [0,031 ± 0,006]	14,3
12	12,0 [0,472]	6,0 [0,236]	0,90 ± 0,15 [0,035 ± 0,006]	22,9
18	18,0 [0,709]	9,0 [0,354]	1,00 ± 0,20 [0,039 ± 0,008]	35
24	24,0 [0,945]	12,0 [0,472]	1,10 ± 0,20 [0,043 ± 0,008]	55,69
40	40,0 [1,575]	20,0 [0,789]	1,30 ± 0,25 [0,051 ± 0,009]	103,5
50	50,0 [1,969]	30,0 [1,181]	1,50 ± 0,30 [0,059 ± 0,012]	176

[a] Inch dimensions are for guidance only.

4.2 Conditions of test

Unless otherwise specified, tests shall be carried out on specimens of sleeving recovered by conditioning in a fan assisted air circulating oven at (200 ± 5) °C for (4 ± 1) min and allowed to cool in air to ambient temperature. No pre-conditioning period is required prior to testing. Unless otherwise specified, all tests shall be made under standard ambient conditions according to IEC Publication 212. In cases of dispute the tests shall be carried out at a temperature of (23 ± 2) °C and at (50 ± 5) % relative humidity.

4.3 Tests

See Table 2.

Table 2 — Tests *(1 of 3)*

Designation of the test	IEC 60684-2 Clause or Subclause	Requirements	Remarks
Dimensions	3		—
– internal diameter	3.1.2	Table 1	
– wall thickness	3.3.2	Table 1	
– concentricity	3.3.3		
• expanded		Shrink ratio 2:1: 65 % min.	
• recovered			
Density	4	1,2 max.	See Clause 38.
Heat shock	6		4 h ± 15 min.
Tensile strength	19.1 and 19.2	8 MPa min.	Heat at 215 °C ± 5 °C
Elongation at break	19.1 and 19.2	200 % min.	
Longitudinal change	9	Shrink ratio 2:1	Heat the expanded sleeving at 200 °C ± 5 °C for (5 ± 1) min
Bending after heating	13	Not applicable	See Clause 6, Clause 39 and Clause 50.
Bending at low temperature	14	No cracks shall be visible	Condition at – 75 °C ± 3 °C. For strips, the mandrel shall be between 20 and 22 times the wall thickness. Full section sleeving is tested unfilled and the mandrel shall be between 20 and 22 times the outer diameter.
Dimensional stability during storage	16	The dimensions shall be as specified in Table 1.	—
Tensile strength	19.1 and 19.2	12 MPa min.	Use a jaw separation rate of 100 mm/min. Below 6,5 mm diameter test as sleeving, at 6,5 mm diameter and above test as dumb-bells.
Elongation at break	19.1 and 19.2	350 %	
Secant modulus at 2 % elongation	19.5	Between 10 MPa and 35 MPa	—

Table 2 — Tests *(2 of 3)*

Designation of the test	IEC 60684-2 Clause or Subclause	Requirements	Remarks
Breakdown voltage	21	Table 6	—
Volume resistivity – at ambient temperature – after damp heat	23 23.5.2 23.5.4	 10^{10} Ω·m min. 10^{9} Ω·m min.	—
Flame propagation Time of burning Length burned	26 Method C	 30 s max. 75 mm max.	—
Oxygen Index At ambient temperature	27 27.1	 30 min.	—
At elevated temperature	27.2	250 °C min.	
Corrosion resistance (Tensile strength and Elongation)	32	Not applicable	See Clause 33.
Copper corrosion	33	None above the allowable 8 % max.	Heat for (16 ± 0,5) h at 150 °C ± 3 °C
Colour fastness to light	34	The colour contrast between the exposed and unexposed parts of the specimens shall be equal to or less than that of the fastness standard. After this test transparent sleevings, type C, shall meet the requirements for transparency.	Fastness standard No. 5
Resistance to selected fluids Tensile strength Elongation at break	36 19.1 and 19.2 19.1 and 19.2	 8 MPa min. 200 % min.	Use the fluids and test temperatures specified in Table 4. Immersion time (24 ± 1) h
Thermal endurance	37	Not applicable	See Clause 50.
Mass per unit length	38	Table 1	—
Heat ageing Elongation at break	39 19.1 and 19.2	8 MPa min. 200 % min.	Heat at 160 °C ± 3 °C
Water absorption	40	2,0 % max.	—
Restricted shrinkage Visual	41	No cracking or splitting	Perform the visual determination only